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Lecirelin and Buserelin (Gonadotrophin releasing hormone agonists) are equally effective for fixed time insemination in buffalo

A Lecirelina apresenta eficiência similar à da Buserelina (agonistas do hormônio liberador de Gonadotrofinas) para inseminação artificial em tempo fixo em bubalinos

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SUMMARY

Buffalo has peculiar reproductive patterns, which make artificial insemination programs a hard and expensive task. Artificial insemination in fixed time is advantaged because females show low incidence of homosexual behaviour and strong dominance relationships, which leads to a poor accuracy in estrus detection. The aim of this experiment was to compare the efficiency of two different GnRH agonists in the GnRH/$PGF_{2\alpha}$/GnRH protocol (Buserelin vs Lecirelin). Two hundred and seventy buffaloes with 45 to 60 days postpartum were synchronized and fixed-time inseminated. The animals were kept on pasture in two farms at São Paulo and Mato Grosso do Sul (Brazil). Cows in Group 1 (n = 132) received, intramuscularly, 20 µg of Buserelin at a random day of the estrous cycle and, seven days later, 15 mg of prostaglandin $F_{2\alpha}$. Two days after prostaglandin administration, 10 µg Buserelin were intramuscularly injected. Cows in Group 2 (n = 138) were treated with the same protocol, but with intra-muscular administrations of Lecirelin (50 µg in the first administration and 25 µg in the second). Artificial insemination was performed 16 hours after the last injection in both groups. Pregnancies were diagnosed by ultrasonography (Pie Medical 480, 5.0 and 7.5 MHz linear probe), 30 days after artificial insemination. Conception rates were not influenced by farm ($P > 0.05$) and were similar in both groups [Group 1: 47.0% (62/132); Group 2: 50.0% (69/138); $P > 0.05$]. Results show that Lecirelin is as efficient as Buserelin to synchronize ovulation for fixed-time artificial insemination in buffaloes.

UNITERMS: Buffalo; Synchronization of ovulation; GnRH; Lecirelin; Buserelin.

INTRODUCTION

In the last years, buffalo herd's size has drastically increased in Brazil and in the world, adding up around 164.3 million animals[12]. However, there is a large variation in the productive performance and genetic improvement can quickly optimize it. Artificial insemination can improve production also, as it makes possible the use of a high quality semen at accessible costs.

However, buffaloes show some peculiarities that limit the introduction of an artificial insemination program in the management of the farms. Differently of bovine females, buffaloes present limited homosexual interaction, around 3.44%[3], and vasectomized teaser bulls must be used. Management difficulties can also be caused by other specific buffaloes characteristics, such as dominance relationship among individuals and reproductive seasonality. Moreover, poor accuracy in estrus detection can compromise the results. In this way, a few farmers are encouraged to change the farm management and this is an agent that limits the improvement of artificial inseminaton.

Strategies that make possible the control of the time of ovulation, independent of estrus observation, can solve most of the management problems. Therefore, researches have been done in buffalo females to employ synchronization protocols based either on progesterone[9] or GnRH[6].

Ovulation can be synchronized in cattle by two injections of GnRH agonist at a 9 days interval, with prostaglandin administration on the 7th day, with relative success[15,17]. Pregnancy rate in treated animals tends to be similar[10] or even higher[11] than the control group (estrus detected), because of the large number of inseminated females (service rate = 100%). On the other hand, feeble responses to the treatment are observed in heifers[15].

Experiments made in Brazil showed that protocols for synchronization of ovulation can result in satisfactory conception rates (50 – 60%) in buffaloes, when Buserelin is used as a GnRH agonist[8,6].

Lecirelin, a synthetic hypothalamic hormone of prolonged action, is a superanalog of GnRH, obtained through the gonadorelin's structure modification. However, its efficacy in buffaloes ovulation synchronization has not been reported yet. The aim of this study is to evaluate the success of the protocol when Lecirelin is used instead of Buserelin.

MATERIAL AND METHOD

In this experiment, 270 lactating buffaloes ranging from 45 to 60 days postpartum were utilized from two different farms, located in São Paulo (Farm A; n = 143) and Mato Grosso do Sul (Farm B; n = 127), in Central-South Brazil, during the year of 1999 (April to July). The animals were raised on *Brachiaria*

decumbens pasture management, receiving commercial mineral supplementation.

In each farm, the buffalo cows were divided in two groups, regarding to body condition and post partum interval. Group 1 was composed by 132 animals, and Group 2 by 138.

Ovulation was synchronized by two GnRH agonist intramuscular injections at 9 days interval. Females in Group 1 received Buserelin (Conceptal®, Hoechst) as GnRH agonist (20 µg in the first administration and 10 µg in the second). In Group 2, the GnRH agonist used was Lecirelin (Gestran-plus®, Tecnopec). The doses of Lecirelin were 50 and 25 µg, respectively in the first and in the second administrations. Seven days after the first injection, 15 mg of a prostaglandin analogue, luprostiol (Luprostiol, Prosolvin®, Intervet) was administered in both groups. The buffalo cows were inseminated 16 hours after the last administration without attempt to estrous behaviour. The protocols are summarised in Fig. 1.

Pregnancy diagnostic was made 30 days post-inseminations by way of ultrasound scanning (PIE MEDICAL 480, Netherlands), using a 5.0 MHz linear probe. Conception rates between Groups 1 and 2 were analysed by Chi Square analysis, with significance level of 5%.

RESULTS

As shown in Tab. 1, mean conception rates regarding the GnRH agonist used were 47.0% for Buserelin and 50.0% for Lecirelin. There was no statistical difference between groups ($P > 0.05$). Also, no difference was found ($P > 0.05$) on conception rates between treatment groups within farms (Farm A = Buserelin 48.5% vs Lecirelin 50.7% and Farm B = Buserelin 45.2% vs Lecirelin 49.2%).

Table 1

Conception rates according to the GnRH agonist employed for synchronization of ovulation in the GnRH/$PGF_{2\alpha}$/GnRH protocol in buffaloes. Central South Brazil, 1999.

Treatment	GnRH agonist	Conception Rate (n)
Group 1	Buserelin	47.0% (62 /132)
Group 2	Lecirelin	50.0% (69/138)
Total		48.5% (133/270)

Table 2

Conception rates according to farm and GnRH agonist employed for synchronization of ovulation in buffaloes. Central-South Brazil, 1999.

Farm	Treatment	GnRH agonist	Conception Rate (n)
Farm A	Group 1	Buserelin	48.5% (34/70)
	Group 2	Lecirelin	50.7% (37/73)
Farm B	Group 1	Buserelin	45.2% (28/62)
	Group 2	Lecirelin	49.2% (32/65)

DISCUSSION

A mean conception rate of 48.5% after a single timed artificial insemination was obtained when the GnRH/$PGF_{2\alpha}$/GnRH system was employed to synchronize ovulation. This result is similar to the conception rates reported in other studies[5,13], in which artificial insemination was performed after visual estrus detection. Thus, we conclude that ovulations were highly synchronized, and that an adequate fertility was achieved.

An important aspect is that when this protocol is applied, estrus behaviour must not be detected, even because GnRH inhibits estrous manifestation promoting silent ovulations[7].

Previous experiments with ovulation synchronization in buffaloes reported the use of Buserelin as GnRH agonist, providing conception rates such as 48.8% in dairy[6] and 56.5% in beef animals[8]. The present study shows that its substitution by Lecilerin does not induce significant differences in the results (conception rate of 47% for Buserelin and 50% for Lecirelin). The large number of animals in each group, and the similarity of results in two different farms, suggest that Lecirelin can be successfully utilized in buffaloes in the GnRH/$PGF_{2\alpha}$/GnRH system, providing adequate conception rates. Since Lecirelin has lower cost, the use of this GnRH agonist represents an improvement in the usefulness of the synchronization protocol.

On the other hand, the conception rates in response to the treatment with GnRH agonist in cattle have been presenting large variation. In the case of Fresian cows, there are reports of conception rates of 16.7%[1] or 33% in Brazilian conditions when cows were treated at 50 days post partum[14], 37.8%[16], 55.0%[15] in American dairy cows, or even 13.9% in heat stressed cows[11]. Bartolomeu et al.[2] obtained a conception rate of 46.7% in dairy

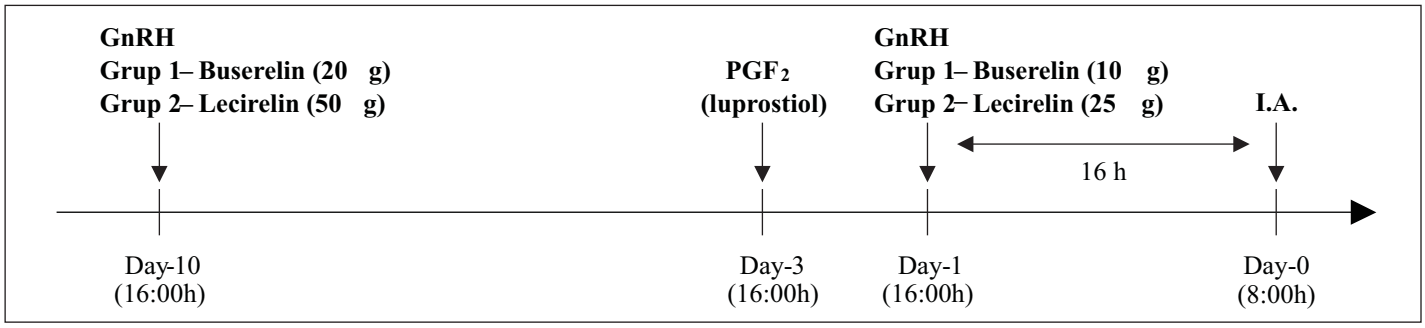

Figure 1

Protocols used for ovulation's synchronization in buffalo followed by artificial insemination in fixed time.

cross-bred *Bos taurus x Bos indicus* cows. The variability of the results may be attributed to different management systems and/or anestrous conditions of the females. In this experiment small variation between farms and treatments was observed. Considering that buffaloes in Brazil are generally raised under similar extensive conditions, in which they present early re-establishment of post partum ovarian activity (mean of 36 days)[5], small variation may be expected between results of synchronization of ovulation in other experiments, since minimum good management conditions be maintained.

In this experiment, animals were treated 45 to 60 days after parturition. Based on the pregnancy rates, it is concluded that it is possible for buffalo cows to present a 12-13 months interval between parturition, even when submitted to artificial insemination procedures. Thus, genetic improvement can run closely with optimized reproductive performance when ovulation is synchronized.

Additionally, the system turns possible to inseminate 100% of the females, without conception delays that could be caused by failure of estrus detection. If the management in the farm is based on a single insemination for each female, then only around half of them will be destined to natural breeding, which permits a reduction in the number of bulls. In this manner, gain on sale of bulls may be considered as an indirect economic advantage, with the need of a smaller number of males with high genetic merit.

Baruselli[4] reported that 56% of nonpregnant buffaloes, which ovulation had been synchronized, showed estrus between 18 and 25 days post insemination. This data suggests the possibility of an intensive management of heat detection and artificial insemination with the course of seven days period. Therefore, a large number of animals, which did not become pregnant at the treatment, should be re-inseminated.

In synthesis, this experiment has shown that Lecirelin can be used as a GnRH agonist for ovulation synchronization of early postpartum buffalo females, by the GnRH/$PGF_{2\alpha}$/GnRH protocol, with fixed time artificial insemination, leading to suitable conception rates. In addition, Lecirelin has important practical advantage compared with Buserelin, permitting a reduction in the protocol costs.

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RESUMO

O uso de protocolos de sincronização da ovulação em bubalinos é bastante vantajoso, em virtude de certas peculiaridades apresentadas pela espécie que podem prejudicar programas de inseminação artificial, como a baixa incidência de comportamento homossexual e relações de dominância entre os animais. Com o objetivo de verificar a eficácia da Lecirelina como agonista de GnRH no protocolo GnRH/$PGF_{2\alpha}$/GnRH, 270 búfalas, com período pós-parto entre 45 e 60 dias, mantidas a pasto em duas propriedades, foram submetidas a dois tratamentos de sincronização da ovulação. Os animais do Grupo 1 (n = 132) receberam, em dia desconhecido do ciclo estral, 20 µg de Buserelina IM, sendo aplicados, 7 dias mais tarde, 15 mg de prostaglandina ($PGF_{2\alpha}$). Dois dias após a administração da $PGF_{2\alpha}$, os animais receberam 10 µg de Buserelina, IM. As fêmeas do Grupo 2 (n = 138) foram tratadas seguindo o mesmo protocolo, com a diferença de que, na primeira e na terceira administrações hormonais, se aplicaram, respectivamente, 50 µg e 25 µg de Lecirelina, IM. A inseminação artificial foi efetuada em tempo fixo, 16 horas após a terceira administração hormonal, em ambos os grupos. O diagnóstico de gestação foi realizado por ultra-sonografia, 30 dias após a inseminação artificial. As taxas de concepção foram semelhantes [47,0% (62/132) e 50,0% (69/138) nos Grupos 1 e 2 (P > 0,05)]. Não foi observado efeito da propriedade (P > 0,05) nas taxas de concepção. Os resultados demonstram que é possível utilizar Lecirelina para promover a sincronização da ovulação de bubalinos, com resultados satisfatórios.

UNITERMOS: Búfalo; Sincronização da ovulação; GnRH; Lecirelina; Buserelina.

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